DRAFT -- FOR DISCUSSION PURPOSES ONLY

The listing of claims below is intended to replace all prior listings of the claims in the present application.

Claims 1-7 (canceled)

8. (Previously Presented) The method in accordance with claim 15, wherein the polymer membrane is a microporous film manufactured either by a dry process where pores are formed by low and high temperature stretching or by a wet process where material of low molecular weight is extracted to form pores.

Claims 9-14 (canceled)

15. (Currently Amended) A method for providing hydrophilicity or increased hydrophobicity to the surface of a polymer membrane comprising:

a) inserting a polymer membrane into a vacuum chamber and irradiating the surface of the polymer membrane with ~~energized cationic particles~~ <u>an ionic beam</u> under a high vacuum<u>, said ionic beam being generated by selectively deriving positively charged ionic particles from an ion source and accelerating the ionic particles with energy</u>; and

b) treating the surface-activated polymer membrane obtained in step a) by infusing a reactive gas onto the surface of the polymer membrane to cause reaction of the gas with the polymer membrane surface, wherein the ~~cationic~~ <u>ionic</u> beam irradiation of step a) and reactive gas infusion of step b) are sequentially made.

16. (Canceled)

17. (Currently Amended) The method in accordance with claim 15, wherein the reactive gas infusion of step b) is made without interference of the ~~cationic~~ <u>ionic</u> particles.

18. (Canceled)

19. (Currently Amended) The method in accordance with claim 15, wherein ~~energized cationic particles~~ the ionic beam of step a) ~~are~~ is irradiated on one side or two sides of the polymer membrane.

20. (Currently Amended) The method in accordance with claim 15, wherein the ~~cationic~~ ionic particles of step a) are produced from one or more ion generating gases selected from the group consisting of hydrogen, oxygen, helium, nitrogen, ~~oxygen,~~ air, fluorine, neon, argon, krypton, N_20, and their mixtures.

21. (Previously Presented) The method in accordance with claim 15, wherein the dose of irradiation of step a) is from 10^3 to 10^{20} ion/cm^2.

22. (Currently Amended) The method in accordance with claim 15, wherein the energy of ~~cationic~~ ionic particles of step a) is from 10^{-2} to 10^7 keV.

23. (Previously Presented) The method in accordance with claim 15, wherein the high vacuum of step a) is 10^{-2} to 10^{-8} torr.

24. (Previously Presented) The method in accordance with claim 15, wherein the reactive gas of step b) is infused until the pressure of the vacuum chamber reaches the range of 10^{-6} to 10^4 torr.

25. (Previously Presented) The method in accordance with claim 15, wherein the infusion rate of the reactive gas of step b) is 0.5 to 1000 *ml*/min.

26. (Previously Presented) The method in accordance with claim 15, wherein the reactive gases of step b) are one or more gases selected from the group consisting of helium, hydrogen, oxygen, nitrogen, air, ammonia, carbon monoxide, carbon dioxide, carbon tetrafluoride, methane, N_20, and their mixtures.

27. (Previously Presented) The method in accordance with claim 15, wherein the material of the polymer membrane of step a) is a polyolefin selected from the

group consisting of polypropylene, high density polyethylene (HDPE), low density polyethylene (LDPE), and linear low density polyethylene (LLDPE).

28. (Previously Presented) The method in accordance with claim 15, wherein the material of the polymer membrane of step a) is a polyolefin blend or polyolefin laminate, wherein the polyolefins are selected from the group consisting of polypropylene, high density polyethylene (HDPE), low density polyethylene (LDPE), and linear low density polyethylene (LLDPE).

29. (Previously Presented) The method in accordance with claim 15, wherein the polymer membrane is a separator for a battery.

30. (Previously Presented) The method in accordance with claim 29, wherein the battery is a lithium ion secondary battery or an alkali secondary battery.

31. (Currently Amended) A method for providing hydrophilicity or increased hydrophobicity to the surface of a polymer comprising:

a) inserting a polymer into a vacuum chamber and irradiating the surface of the polymer with ~~energized cationic particles~~ an ionic beam under high vacuum, said ionic beam being generated by selectively deriving positively charged ionic particles from an ion source and accelerating the ionic particles with energy; and

b) treating the surface-activated polymer obtained in step a) by infusing a reactive gas onto the surface of the polymer to cause reaction of the gas with the polymer surface, wherein the ~~cationic~~ ionic beam irradiation of step a) and reactive gas infusion of step b) are sequentially made.